

$$\text{Var}(X) = 10$$

$$\text{Var}(Y) = 20$$

$$Y \sim \alpha + \beta X \Rightarrow \beta = 1 = \frac{\text{Cov}(X, Y)}{\text{Var}(X)}$$

$$X \sim \alpha' + \beta' Y \Rightarrow \beta' = \frac{\text{Cov}(X, Y)}{\text{Var}(Y)}$$

$$= \frac{\text{Cov}(X, Y)}{2 \text{Var}(X)}$$

$$= \frac{\beta}{2} = \boxed{\frac{1}{2}} \text{ Ans}$$

Under MSE (Mean Squared Error),

$$(\hat{\alpha}, \hat{\beta}) = \underset{\alpha, \beta}{\operatorname{argmin}} E[(Y - \hat{f}(X))^2]$$